

AMENDMENTS TO THE DRAWINGS

Please amend the figures as shown in the enclosed replacement sheets. The attached sheets of drawings include changes to Figures 15, 19, 28, 29, 30 and 32. These figures have been amended to include the reference numbers 570 and 571, which are found in the specification, for example, in the amended paragraphs [0217] and [0220]. Reference number 570 points out the “internal space” referenced previously in the specification, but not previously denoted with a reference number. Reference number 571 points out the “protrusive end part” feature referenced previously in the specification, but not previously denoted with a reference number. Further, Figure 15 was amended to include reference number 56, which may be found, for example, in the specification in paragraphs [0217] and [0220]. Reference number 56 points out the “right electrode body” that was already numbered in other figures, but not clearly pointed out in Figure 15. Applicant submits that these replacement figures are formal, and no new matter has been added.

REMARKS

Please reconsider this application in view of the above amendments and the following remarks. Applicant thanks the Examiner for carefully considering this application.

Disposition of Claims

Claims 60-69 are pending in this application. Claims 60 and 62 are independent. Claim 61 depends directly from claim 60, and Claims 63-69 depend, directly or indirectly, from claim 62.

Amendments to Specification

Paragraph [0217] in the specification was amended to include the added reference numbers 570 (“internal space”) and 571 (“protrusive end part”) of the revised Figures 15, 19, 28, 29, 30, and 32. The amendments to paragraph [0217] also provide a clear description of the claimed “protrusive end part” 571, which was previously shown in the figures but not denoted by a separate reference number.

Paragraph [0220] in the specification was amended to clarify the “first dielectric case body” and “second dielectric case body” limitations recited in claim 62. “First dielectric case body” may refer to the “left dielectric case body” using the Figures’ orientations, in which the two terms may be used interchangeably. Similarly, “second dielectric case body” may refer to the “right dielectric case body.” Further, paragraph [0220] was similarly amended to clarify the “first electrode body” and “second electrode body” limitations also recited in claim 62.

Both paragraphs [0217] and [0220] in the specification were amended to replace the references to a “main body” with “body.” Both paragraphs [0217] and [0220] in the specification were also amended to properly reference the “second electrode body” 56 which

was already included in the figures. No new matter has been added by way of these amendments.

Amendments to the Claims

Claim 60 was amended to clarify the claim language by changing “a metallic electrode body” to “a metallic electrode body having a plasma generating surface.” The addition of the language “electrode body having a plasma generating surface” to claim 60 is rooted in the language of paragraph [0208] of the specification and references elements already illustrated in Fig. 20. For example, paragraph [0208] of the specification states: “Accordingly, the communication passages 20b between the two electric field impressing electrodes 51 and the lower plate 25 serve as the plasma discharge spaces, respectively” with the numerical element references coming from Fig. 20. Figure 20 illustrates that the lower surface of the electrode body 56 is provided for the plasma generating “surface.” Accordingly, no new matter has been added by way of this amendment.

Claim 60 was also amended to replace the references to an “integral case body” with “integrally formed dielectric case body.” Specifically, the language of claim 60 was amended to recite “an integrally formed dielectric case body ... said plasma generating surface being closely covered with said case body as dielectric layer thereof.” The amendment is supported by the language of paragraphs [0216] and [0217] of the specification as well as Figures 15, 19, and 30. Accordingly, no new matter has been added by way of this amendment.

Claim 62 was amended to recite a “first electrode body having a first plasma generating surface,” an “integrally formed dielectric first case body,” a “second electrode body having a second plasma generating surface,” and an “integrally formed dielectric second case body.”

Support for these amendments may be found, for example, in paragraph [0220] of the specification and in Figure 15. Specifically, Figure 15 shows two electrode bodies 56 and two dielectric case bodies 57a disposed in left and right positions. The left electrode body 56 may be referred to as the “first electrode body,” and the corresponding right electrode body 56 may be referred to as the “second electrode body.” Accordingly, no new matter has been added by way of these amendments.

Claim 61 was amended to reflect the changes to claim 60, and claims 63, 64, 65, 67, and 69 were amended to reflect the changes of claim 62. Accordingly, no new matter has been added by way of these amendments.

Objections to Drawings

The Examiner objected to the drawings under 37 C.F.R. § 1.83 (a) for not showing every feature of the invention in the claims. The Examiner asserts that the features not shown include the “protrusive end part,” “integral case body,” “electrode body,” “internal space,” and “second case body.” As amended, the drawings now clearly show the “protrusive end part” with reference number 571 and the “internal space” with reference number 570. Further, as shown in the claim amendments, the “electrode body” refers to reference number 56, and the “integrally formed dielectric case body” and “second dielectric case body” refer to reference number 57a. Accordingly, the applicant respectfully requests that the Examiner withdraw his objection to the drawings.

Rejections under 35 U.S.C. § 112

Claims 60-69 were rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the enablement requirement. This rejection is respectfully traversed.

As described above, Figures 15, 19, 28, 29, 30, and 32 have all been amended to point out the claimed “protrusive end part,” with reference number 571, in relation to the remaining claimed structures. Additionally, paragraph [0217] of the specification has been amended, as described above, to describe the “protrusive end part” 571 and describe the “protrusive end part’s” relationship to the other pertinent elements of the invention more clearly. Thus, with consideration of the current amendments, Applicant believes the claims as stated comply with the enablement requirement of 35 U.S.C. § 112, first paragraph. Accordingly, withdrawal of this rejection is respectfully requested.

Claims 60-69 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Specifically, the Examiner rejects claims 60-69 because the claimed “protrusive end part” is nowhere present in the specification with a reference number and figure showing the structure and function in relationship to the remaining claimed structures. As described above, paragraph [0217] and Figures 15, 19, 28, 29, 30, and 32 have been amended to describe the “protrusive end part.” Accordingly, withdrawal of this rejection is respectfully requested.

Further, the Examiner asserts that there is insufficient antecedent basis for the use of “first case body” and “second case body” as limitations in claim 62. As described in the Objections to the Drawings section above, the “integrally formed dielectric first case body” and the “integrally formed dielectric second case body” are both pointed out clearly in, for example, Figure 15 with reference number 57a. Accordingly, the references to a “first dielectric case body” and “second dielectric case body” each have a clear antecedent basis, “integrally formed dielectric first case body” and “integrally formed dielectric second case body,” respectively, that

is illustrated in the Figures and described in the specification. The Applicant believes that the issue of an insufficient antecedent basis asserted by the Examiner has been clarified.

Rejection under 35 U.S.C. § 102

Claims 60-62, 65, 66, and 69 are rejected under 35 U.S.C. § 102 (a,e) as being anticipated by U.S. Patent Application No. 2003/0129107 ("Denes"). To the extent that this rejection may still apply to the amended claims, this rejection is respectfully traversed.

Independent claim 60 recites a plasma surface processing apparatus with an electrode structure that is comprised of a metallic electrode body having a plasma generating surface (56 as shown in Figure 15) and an integrally formed dielectric case body (57a as shown in Figure 15). The plasma generating surface is closely covered with the dielectric case body as a dielectric layer. The integrally formed dielectric case body has an opening and an internal space communicated to the opening. The electrode body is received in the internal space through the opening. The dielectric case body is provided with a protrusive end part on a side of the opening thereof. The protrusive end part protrudes relative to said electrode body. Further, independent claim 62 recites a plasma surface processing apparatus similar to claim 60 with first and second electrode bodies having a plasma generating surface, first and second integrally formed dielectric case bodies, and first and second protrusive end parts. Claim 62 further recites that the first dielectric case body and second dielectric case body define a gas passage between the two. Figures 15, 19, 28, 29, 30 and 32 clearly show embodiments of the first and second electrode bodies, first and second dielectric case bodies, internal space, and first and second protrusive end parts of the plasma surface processing apparatus as claimed.

The Examiner rejects claims 60 and 62 on the basis that the “integrally formed dielectric case body” of claims 60 and 62 is shown by element 114 of Denes. However, the Applicant respectfully asserts that Denes fails to show or suggest all the necessary limitations that claims 60 and 62 require, as amended. Specifically, the limitations of claims 60 and 62 require that the electrode body has a “plasma generating surface” that is “closely covered with said dielectric case body as dielectric layer thereof.” Element 114 of Denes does not closely cover a “plasma generating surface” of an electrode body 140 to provide a dielectric layer for the plasma generating surface. The electrode body 140 has many holes, and the inner peripheral surface of each of the holes of the electrode body 140 is the “plasma generating surface,” which is then covered with a dielectric layer 148, not with the element 114. The element 114 does surround three outer surfaces of the electrode body 140, but none of these outer surfaces of the electrode body 140 is the “plasma generating surface” of claim 60. Hence, Denes neither shows nor suggests that the element 114 of Denes corresponds to the “dielectric case body” as claimed in claims 60 and 62.

Additionally, Denes fails to teach or disclose “a protrusive end part,” as recited in independent claims 60 and 62. A first electrode 130 of Denes has a dielectric layer 138 that has an opening. However, the opening end of the dielectric layer 138 stops prior to reaching the first electrode bed 136. The region between the electrode bed 136 and first electrode 130 is disclosed in Denes as the base 132 of the electrode 130. This shows that the dielectric layer of Denes stops short and does not extend to, much less protrude over, the edge of the first electrode. Therefore, the dielectric layer 138 does not have “a *protrusive* end part” as claimed in independent claims 60 and 62 of the invention. Denes instead has a substantially different arrangement in which the dielectric layer stops short of fully extending to cover the first

electrode. As shown in Figure 15, the “protrusive end part” 571 of the present application, as required by claims 60 and 62, extends beyond the edge of the first electrode body. Thus, Denes’ electrode 130 and dielectric case 138 fail to teach or disclose “a protrusive end part” as recited in independent claims 60 and 62 of the invention.

Additionally, Denes discloses another electrode member type 140 and 150 which is covered by a dielectric layer 148. This dielectric layer 148 does not have “an opening” as required by the present invention. Specifically, claims 60 and 62 state, “said electrode body is received in said internal space through said opening.” Without the claimed opening, the protrusive end as claimed is also necessarily missing. Thus, Denes’ electrode members 140 and 150 and dielectric later 148 also fail to teach or disclose “a protrusive end part” as recited in independent claims 60 and 62 of the invention.

In view of the above, Denes does not teach or disclose at least the limitations of a plasma surface processing apparatus comprising “a metallic electrode body having a plasma generating surface,” “an integrally formed dielectric case body,” and “a protrusive end part.” Therefore, Denes lacks at least the limitations discussed above. Because Denes fails to teach or disclose the limitations as stated in independent claims 60 and 62, claims 60 and 62 as amended are patentable over the cited reference. Dependent claims 65, 66, and 69 are also patentable for at least the same reasons. Accordingly, withdrawal of this rejection is respectfully requested.

Rejection under 35 U.S.C. § 103(a)

Claims 63 and 64 are rejected under 35 U.S.C. 103(a) as being unpatentable over Denes in view of U.S. Patent No. 5,500,256 (“Watabe”). To the extent this rejection may still apply to the amended claims, this rejection is respectfully traversed.

As discussed above, Denes fails to show or suggest the present invention as recited in amended independent claim 62, from which claims 63 and 64 depend. Thus claim 62 is patentable over Denes. Watabe is cited as disclosing an electrode plasma apparatus including unmixed gas injection plenums. None of the pertinent limitations of the claimed invention are present in Watabe. Specifically, Watabe is completely silent with respect to at least the above limitations recited in independent claim 62. Therefore, Watabe fails to show or suggest that which Denes lacks.

Specifically, Watabe discloses a chamber 12 having a main body 12a and a ring lid 12b (column 5; lines 20-22). However, the main body 12a is not “an integrally formed dielectric first case body,” nor is it “an integrally formed dielectric second case body,” because the main body 12a is made of metal (column 5; line 19). The main body 12a also does not closely cover said “first plasma generating surface” or “second plasma generating surface.” Hence, Watabe fails to disclose all features of independent claim 62. Watabe does also teach that the gas flow paths 1a and 1b are configured so as to divide a plane into two partial spiral planes (column 4; lines 31-32). However, neither of the gas flow paths 1a and 1b is served by “a recess” as claimed in dependent claim 64.

In view of the above, Denes and Watabe, whether considered separately or in combination, fail to show or suggest the present invention as recited in claims 60 and 62. Thus, claims 60 and 62 are patentable over Denes and Watabe. Dependent claims 63 and 64 are allowable for at least the same reasons and the reasons discussed above. Accordingly, withdrawal of this rejection is respectfully requested.

Claims 67 and 68 are rejected under 35 U.S.C. 103(a) as being unpatentable over Denes in view of U.S. Patent No. 6,137,231 ("Anders"). To the extent this rejection may still apply to the amended claims, this rejection is respectfully traversed.

In view of the above, Denes fails to show or suggest the present invention as recited in amended independent claim 62, from which claims 67 and 68 depend. Thus claim 62 is patentable over Denes. Anders is cited as disclosing a dielectric case plate that varies in thickness in a direction of gas flow, and as disclosing a distance between a first and second electrode that varies along a direction of gas flow. None of the pertinent limitations of the claimed invention are present in Anders. Specifically, Anders is completely silent with respect to at least the above limitations recited in independent claim 62. Therefore, Anders fails to show or suggest that which Denes lacks.

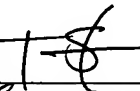
In view of the above, Denes and Anders, whether considered separately or in combination, fail to show or suggest the present invention as recited in claims 60 and 62. Thus, claims 60 and 62 are patentable over Denes and Anders. Dependent claims 67 and 68 are allowable for at least the same reasons and the reasons discussed above. Accordingly, withdrawal of this rejection is respectfully requested.

Conclusion

Applicant believes this reply is fully responsive to all outstanding issues and places this application in condition for allowance. If this belief is incorrect, or other issues arise, the Examiner is encouraged to contact the undersigned or his associates at the telephone number listed below. Please apply any charges not covered, or any credits, to Deposit Account 50-0591 (Reference Number 12088/019001).

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Attachments

APPENDIX: AMENDMENTS TO THE SPECIFICATION

Amendments to paragraph [0217]:

[0217] The case ~~main~~ body 57a includes an internal space 570 of the same configuration as the electrode ~~main~~ body 56. The case [main] body 57a is open to a rear surface (surface on the opposite side to the opposing side of the other electrode 51) thereof. The electrode [main] body 56 is removably received in the internal space of the case ~~main~~ body 57a. ~~The rear surface~~ As shown in FIG. 15, the dielectric case body 57a is provided with a protrusive end part 571 on a side of the opening thereof. The protrusive end part 571 is protruded relative to the electrode body 56. The end surface of the protrusive end part 571 of the case main body 57a is blocked with the lid 57b. Owing to this arrangement, the entire surface of the electrode main body 56 is covered with the solid dielectric layer composed of the case 57.

Amendments to paragraph [0220]:

[0220] ~~The~~ As shown in FIG. 15, the right plate on the side opposing the other electrode 51 in of the left (first) case main body 57a in which the left (first) electrode body 56 is received is thin at the upper side, thick at the lower side and formed at the intermediate part with a step. The left plate of the right (second) dielectric case body 57a in which the right (second) electrode body 56 is received is thin at the upper side, thick at the lower side and formed at the intermediate part with a step. Owing to this arrangement, the ~~flow gas~~ passage 50a between the ~~pair of electrodes 51~~ first and second case bodies 57a, 57a is wide in width at the upper side and narrow in width at the lower side.